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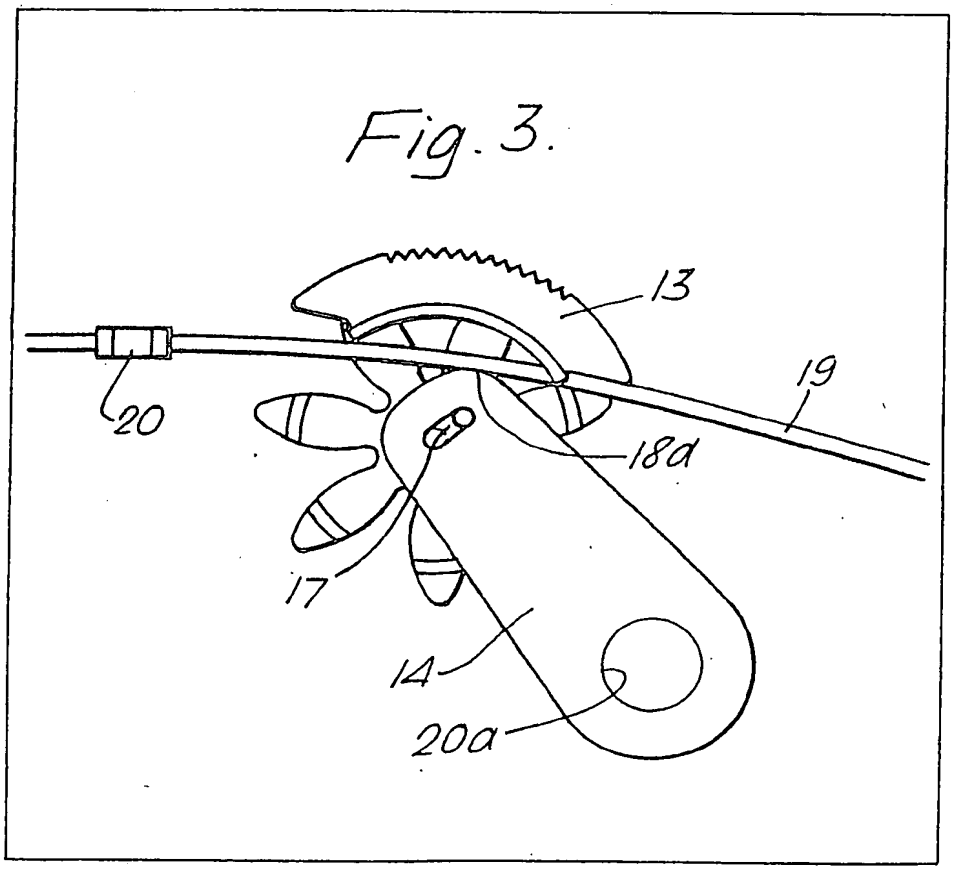
(54) Lockable load-transfer or traversing device

(57) A load-transfer device comprising at least one rotatable wheel having a series of equally spaced peripheral recesses and a guide member (13) mounted at a peripheral part of the wheel. The device engages with an elongate member (19) for sliding movement therealong. The wheel and guide member have cooperating portions allowing rotation of the wheel about its axis relative to the guide member to allow transversely extending support elements (20) of the elongate member to pass through the device in one of said recesses as the wheel rotates relative to the guide member. In order to allow the device to be temporarily held at positions along the elongate member, the device is provided with a movable locking member (14) which has a portion (18*a*) which, in an engaged position of the locking member, cooperates with a portion of the guide member (13) to grip firmly the elongate member (19) therebetween.

In one arrangement, the load transfer device slides, freely when a load is applied in one direction but locks when the load is applied in the opposite direction.

Fig. 3.



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The drawings originally filed were informal and the print here reproduced is taken from a later filed formal copy.

Fig. 1.

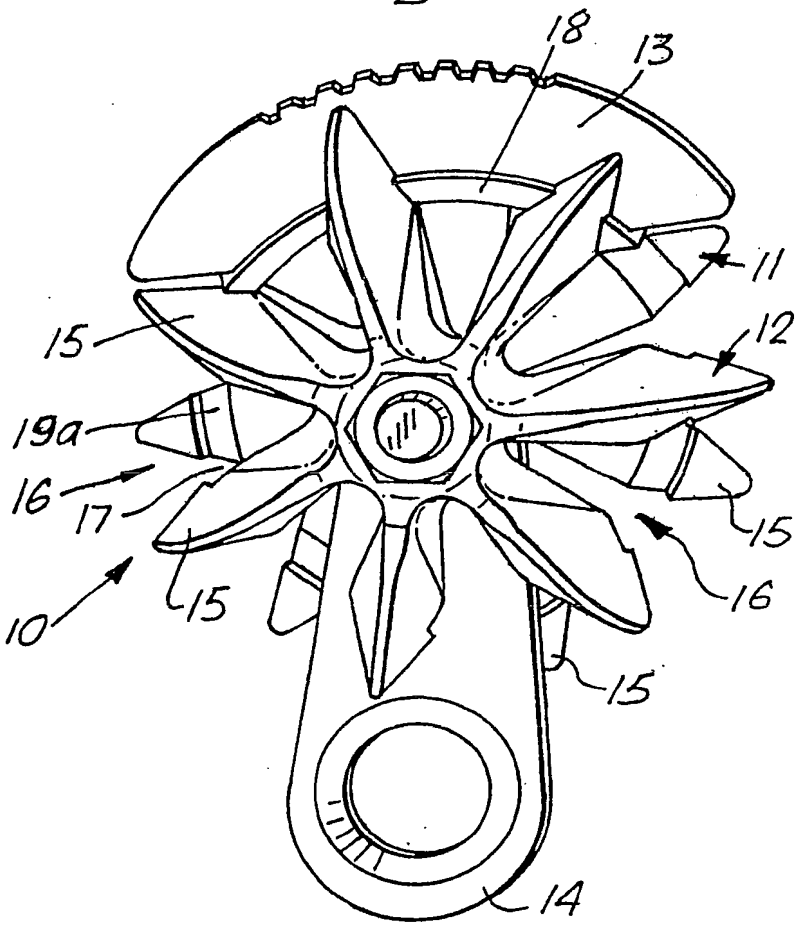


Fig. 2.

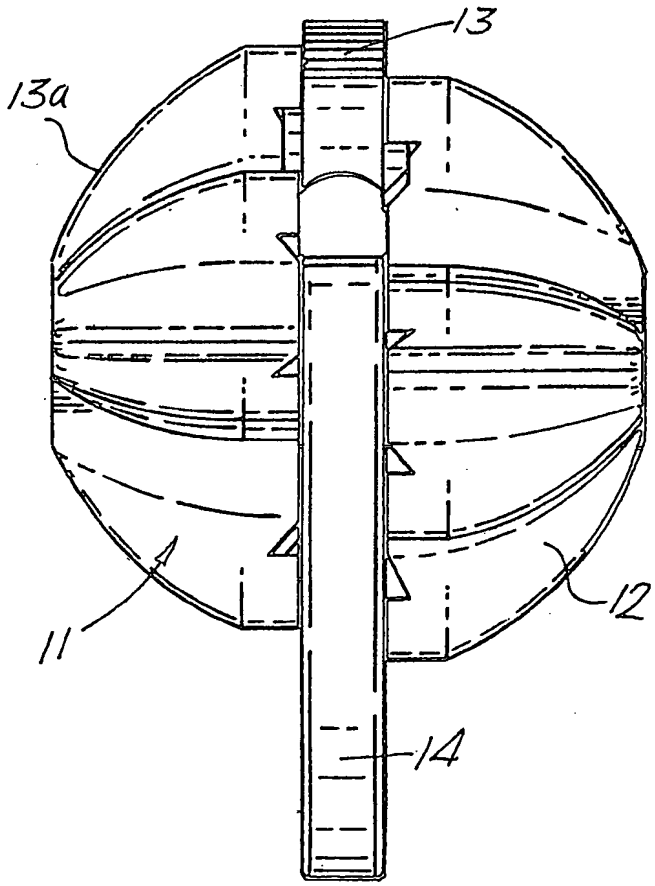


Fig. 3.

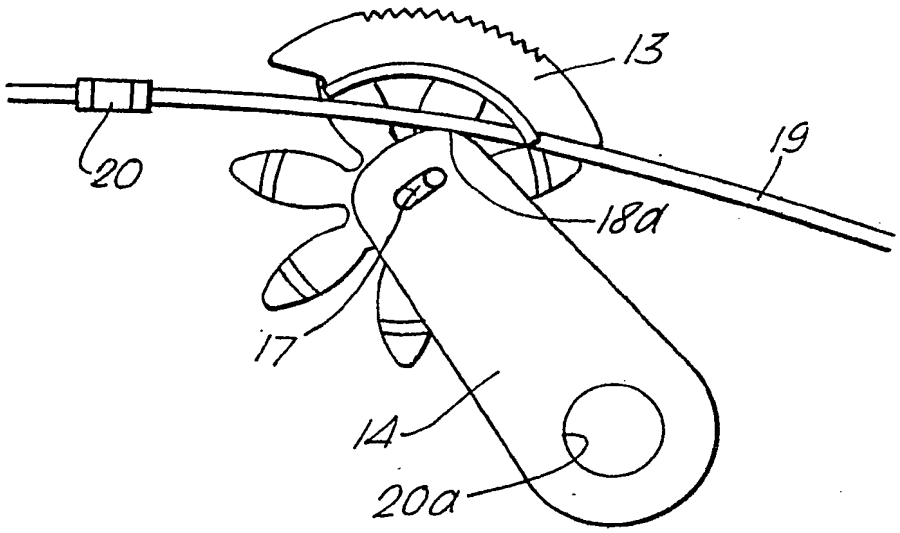


Fig. 4.

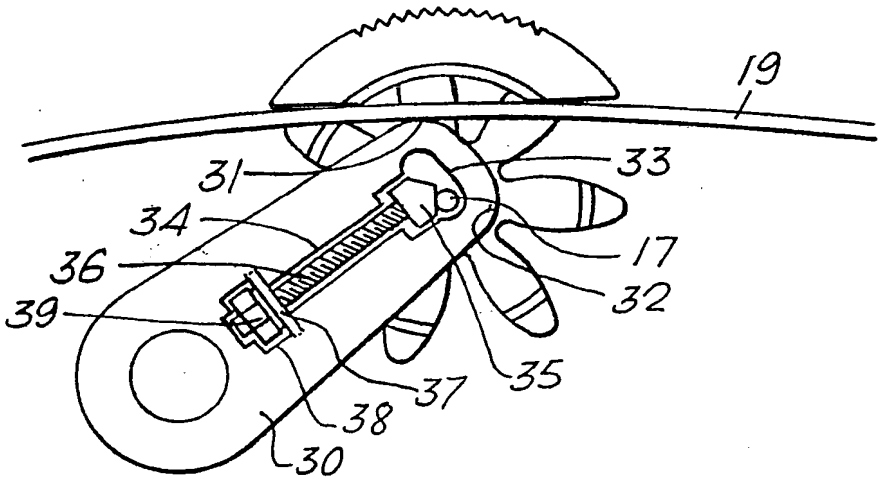


Fig. 5.

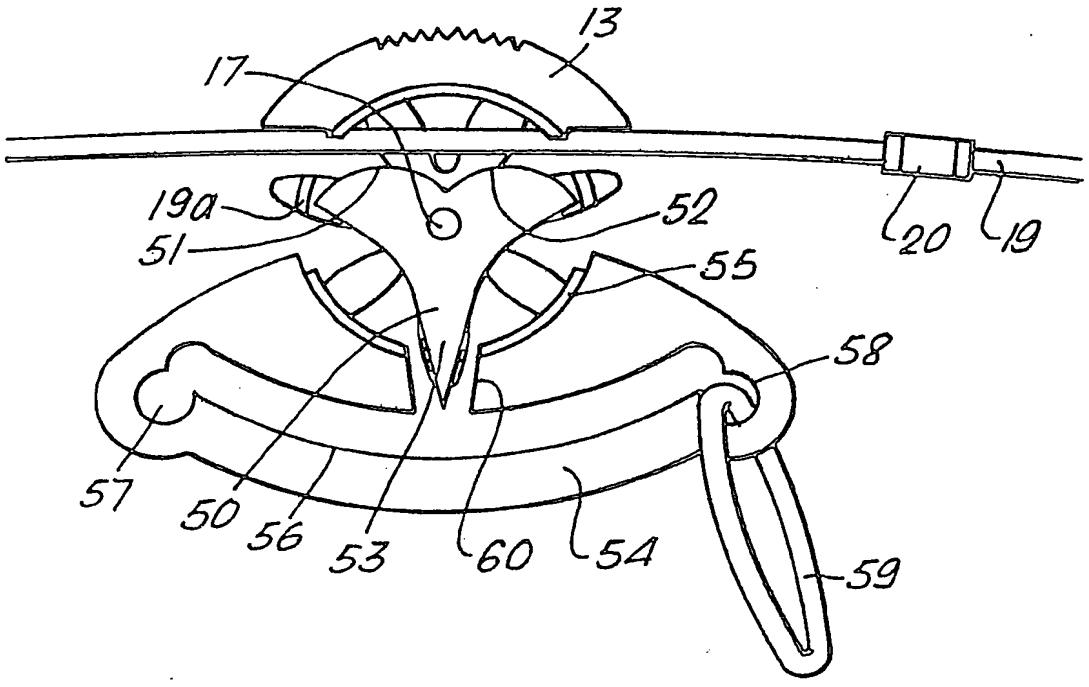


Fig. 6.

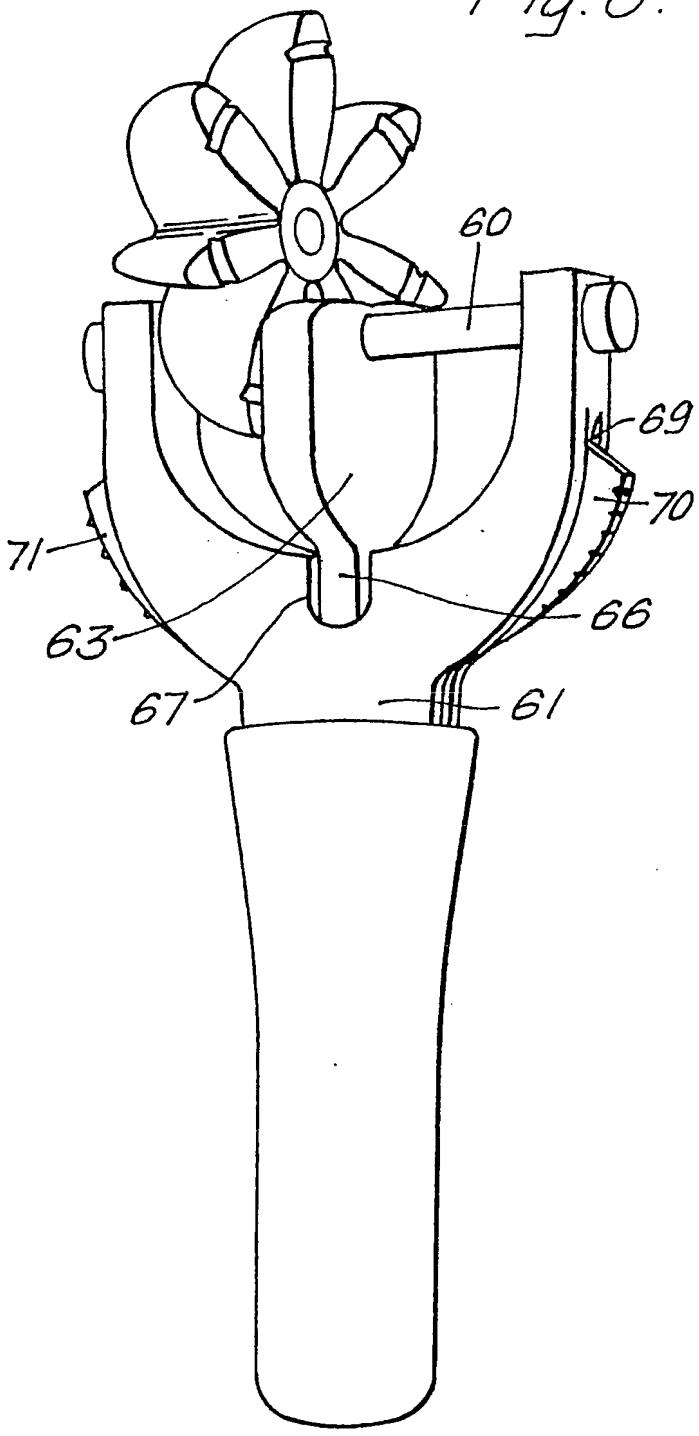
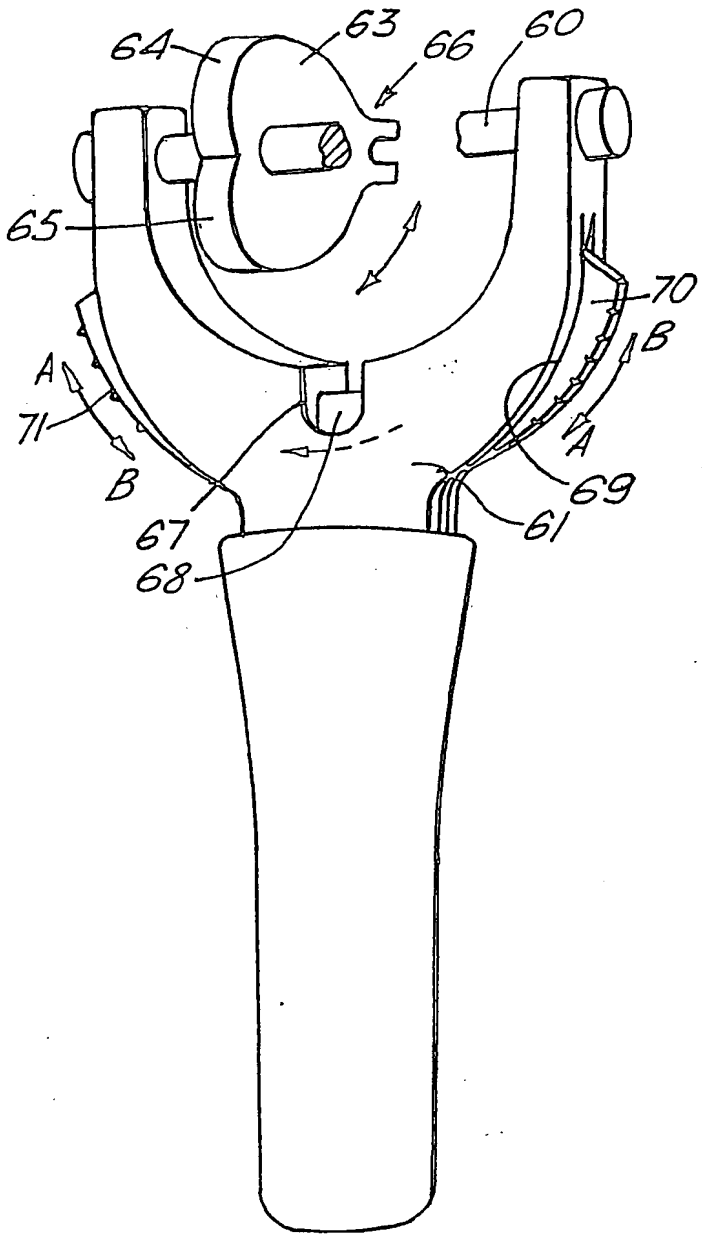


Fig. 7.



SPECIFICATION

Lockable load-transfer or traversing device

The invention relates to a device for enabling a load to be moved along a path defined by an elongate guide element freely past support or attachment points for the guide element.

The invention provides a load-transfer device, which comprises at least one wheel having recesses formed in its periphery at evenly spaced locations therearound and separated by projecting parts of the wheel, and a co-operating guide member mounted on the wheel to form a unitary structure therewith, and adapted and arranged to allow rotation of the wheel about its axis with respect to the guide member while locating an elongate member with respect to the wheel such that when the device is moved along an elongate member slidably engaged with the guide member, transverse supports for such member are received, guided and passed in the recesses of the wheel which then rotates relative to the guide member while the elongate member is located with respect to the wheel by the guide member; and locking means mounted on the wheel and adapted to co-operate, when moved to a locking position, with a portion of the guide member so as to enable an elongate member slidably engaged, in use, with the guide member to be gripped firmly therebetween.

Preferably said locking means comprises a locking member pivotally mounted about the axis of the wheel and being shaped such that in said locking position an edge portion thereof co-operates with said portion of the guide member as aforesaid. The locking member may have an extension or co-operating actuating means for facilitating controlled movement of the locking member between said locking position and a free position.

In some embodiment of the invention the locking member may have the form of a cam pivoted on the axis of the wheel and having a curved peripheral surface which can be brought into gripping engagement with a line, in use slidably engaged with the guide member, by pivotal movement of the locking member in one direction of rotation, the device otherwise being free to move along an elongate member engaged therein.

In such embodiments the locking member may extend radially outwardly of the periphery of the wheel on the opposite side of its axis to the guide member when the locking member is in the locking position to provide a projecting portion which can be gripped by an operator or to which a load attachment can be secured.

In said embodiments of the invention the locking member may have two discrete curved peripheral cam surface and may have means for altering the position of its pivotal axis about the axis of the wheel such that a respective one of the two cam surfaces is brought into an operative position, in accordance with the position of said pivotal axis, for permitting locking of the device to an elongate member when the locking member is rotated in one direction, in respect of one cam surface, and for permitting such locking when the locking member is rotated in the other direction in respect of the other cam surface. Said means may comprise a slot in the locking member in which an axle of the wheel engages and clamping means to locate such axle selectively at one or other end of said slot. Said clamping means may comprise a clamping member which is slidably mounted on the locking member between a retracted position allowing the axle to be freely moved along the slot and an extended position in which it projects into the slot to confine the axle in one or other end portion of the slot and actuating means to move clamping member between those positions. Said actuating means may in some embodiments comprise a screw member projecting from the locking member and a nut member rotatably mounted on the locking member in co-operation with the screw member such that rotation of the nut member causes axial movement of the screw member to move the clamping member between said retracted position and said extended position and vice versa.

In further embodiments of the invention, the locking member may have at least one curved peripheral cam surface to grip an elongate member in co-operation with the guide member and a part projecting generally radially of the axis of the wheel away from its curved cam surface(s), and may be provided with actuating means pivotally mounted about the axis of the wheel and having at least one abutment for engagement with said part of the locking member on sufficient pivotal movement of the actuating means in one or a respective, direction and movement thereof to a position to bring the, or a respective cam surface, into gripping engagement with an elongate member extending in use through the device in sliding engagement with the guide member, the actuating means may be adapted for the connection thereto of a load attachment means such that the actuating means are responsive to the direction of the load applied thereto so as to cause locking of the device by pivotal movement of the actuating means when the load is applied to one general direction along the elongate member and to allow generally free movement of the device along the elongate when the load is applied in the other general direction along the elongate member with little or no pivotal movement of the actuating means. In such constructions and where the locking member is provided with two cam surfaces on opposite sides of the axis of the wheel (in the longitudinal direction of an elongate member extending through the device in use), the actuating means may be provided with two abutment surfaces for engaging opposite sides of said projecting part respectively when the actuating means are pivoted in one or other direction, and means are provided to allow adjustment of the position of the connection to the actuating means of said load attachment means such that in one such

connection position, the device is free to move in a first direction along the elongate member when the load is applied generally in a first direction along the elongate member but is locked when the load is applied generally in the other direction along the elongate member, and vice versa.

In such constructions the actuating means may comprise a plate member pivotal mounted on the wheel, e.g. by an arcuate flange or flanges on the plate member which engage in corresponding arcuate grooves in the projecting parts of the wheel which grooves also receive a corresponding arcuate flange on the guide member, the plate-member having an elongate, generally arcuate slot therein extending around and outwardly of the periphery of the wheel, and in use in a position generally diametrically opposite the guide member, and two recesses adjacent opposite ends of the slot and communicating therewith to receive a load-attachment member engaged in the slot and which can thereby be moved along the slot to be engaged selectively in one or other recess at a respective end of the slot, the plate member being further formed with a slit extending from its periphery into the slot at a central part thereof, the slot being disposed to receive therein, with clearance, said projecting part of the locking member with opposite side walls of the slit provide two abutment surfaces for engagement with respective sides of the projecting part as aforesaid.

In further embodiments of the invention, a yoke load attachment element may be provided to support an assembly of a pair of recessed wheels, the guide member and the locking means between its arms. The locking means may comprise said locking member which has a tail portion movably through a recess in the body of the yoke member on pivotal movement of the locking member, latch means being provided to engage, when actuated, in the slot to block movement of said tail portion therethrough. Said tail portion may have a slot therein in which said latch means can be engaged in order to fixedly locate the locking member with respect to the yoke member in said free position of the locking member.

In a preferred embodiment the wheel comprises two spaced wheels having corresponding and axially aligned recesses, which may be independently movable or may in other embodiments be secured together for rotation in unison, e.g. by an axle to which they are fastened. The guide member may be located between and at a peripheral portion of the wheels, and the confronting surfaces of the projecting parts of the wheels may have arcuate grooves in which corresponding flanges on the guide member engage so as to retain the guide member between the wheels while allowing rotation of the wheels about their axes relative to the guide member. In such constructions, the wheels may have generally dome-shaped outer surfaces to provide adequate material in the region of the grooves to reduce the likelihood of fracture thereat. In such embodiments the locking member is generally disposed between the wheels and is pivotally mounted on the axle thereof. The wheels the guide member and the parts forming the locking member may be fabricated metal parts made, for example, by machining, pressing, forging or casting. In some applications it may be possible to make some or all of the elements of the device from a suitable durable plastics material, e.g. Nylon.

The traversing device may have other forms, for example adaptations of the devices described and claimed in my British Patent Specification No. 1582201 or in my British Patent Application No. 8112221.

Embodiments of the invention will now be described by way of example and with reference to the accompanying drawings in which:—

Figure 1 is a perspective view of a device embodying the invention;

Figure 2 is a side view of the device for figure 1;

Figure 3 is a front view of the device in figure 1, on a smaller scale, with one of the wheels removed;

Figure 4 is a front view of another embodiment of a device in accordance with the invention, with one of the wheels removed;

Figure 5 is a front view of a third embodiment of the device in accordance with the invention, with a wheel thereof removed;

Figure 6 is a perspective view of a fourth embodiment with one wheel and the guide member of the device removed; and

Figure 7 is further perspective view of the device of figure 6 showing the locking member thereof in a locking position.

Figures 1 to 3 of the drawings show a load-transfer device 10 embodying the invention, which comprises two wheels 11 and 12, a guide member 13, and a locking member 14 by which a load can be attached to the device. As seen in Figure 2, each wheel 11, 12 has a generally dome-shaped outer surface with a flat inner surface facing the similar surface on the other wheel. The dome-shaped surfaces 13a comprise a relatively flat central area joined by an annular curved section to an annular axially extending outer rim portion. The central area need not necessarily be flat as shown in the present embodiment. Referring again to Figure 1, each wheel, in this particular embodiment, has seven radially projecting portions 15, which define therebetween seven equi-angularly spaced recesses 16. The wheels are rotatably mounted on an axle 17 in a spaced apart relationship as seen in Figure 2.

The guide member 13, positioned between the wheels at a peripheral part thereof, has a pair of axially projecting arcuate flanges 18 which engage in correspondingly shaped grooves 19a formed in the inner confronting surfaces of the projecting parts 15 of the wheels thereby to locate the guide member 13 in position between the wheels while allowing the wheels to rotate complete revolutions in either direction with respect to the guide member.

As seen in Figure 3, the locking member 14 extends between the wheels and is pivotally mounted at one end on the axle 17. At that end, the locking member 14 is formed with a protruding cam surface 18a which can be brought to bear against the elongate member 19, e.g. a wire extending through the device between the wheels and in sliding engagement with the guide member 13. The locking member 14 projects outwardly of the wheels and at its other end is provided with an eyelet 20a in which a load attachment device can be secured. If the device is used on a yacht for example, the hook of a lanyard attached to a life jacket may be clipped into the eyelet 20a. In the arrangement shown in Figure 3, the device 10 is free to slide along the wire 19 when the load applied to the locking member 14 tends to rotate it in an anti-clockwise direction, but when the load changes to rotate the member 14 in a clockwise direction the cam surface 18a is brought to bear against the wire 19 thereby firmly gripping it between the cam portion 18a and the adjacent edge of the guide member 13 to lock the device 10 in that position on the wire 19.

When the device 10 slides along the wire 19 in use, and the device 10 encounters a transverse support 20 for the wire 19, the transverse member is received in a recess in one or both wheels of the device which, on further sliding movement of the device 10, rotate relative to the guide member 13 allowing the transverse support to pass through the device with the wire located by the guide member 13 with respect to the load transfer device 10 which therefore remains securely engaged with the wire even when traversing intermediate lateral support members for the wire.

The components of the load-transfer device 10 can be made by any suitable material, for example a metal, such as stainless steel, or for lighter uses a plastics material may be used.

The load-transfer device shown in Figure 4 is generally similar to that shown in Figures 1 to 3 with the exception that a modified locking member 30 is used. This locking member allows adjustment of the position where the member is pivotally mounted on the axle 17 between two such positions so that one or other of two peripheral cam surfaces 31 and 32 can be brought into an operative position to the wire 19 in accordance with a respective one of the two possible pivotal positions of the member 30. The member 30 has a transverse slot 33 for receiving the axle 17. A longitudinal slot 34 extends along the member 30 from a central position in the slot 33. The slot 34 has an enlarged upper portion in which a clamping member 35 having a triangular head, is slidably received. A screw threaded member 36 connected to the clamping member 35 extends longitudinally through the narrower portion of the longitudinal slot 37 and through an perture in an end wall of it. A generally rectangular aperture 38 is formed in the member adjacent the lower end of the slot 37 and the screw threaded member 36 projects into this aperture. A nut member 39 is positioned in the aperture 38 in threaded engagement with the screw threaded member 36 so that rotation of the nut causes the screw threaded member to move longitudinally in one or other direction depending on the direction of rotation of the nut thereby moving the head portion of the clamping member 35 from a retracted position in which it does not project into slot 33 to an extended position in which it projects into the slot 33 thereby confining the axle 17 to one or other end portion of the slot 33 as required.

With the device in Figure 4, it is therefore possible to adjust the pivotal mounting position of the locking member on the axle 17 in order to bring one or other of the cam surfaces 31, 32 into an operative position. The device functions in the same way as the device of Figure 3 but allows it to be adjusted so that the direction in which the load is applied to the locking member 30 in order to cause locking of the device to the wire 19 can be reversed. It will be appreciated that any suitable means, other than the screw member 36 and the nut 39 may be employed in other embodiments for adjusting the position of the clamping member 35.

In the embodiment shown in Figure 5, the locking member is in the form of a roughly Y-shaped part 50 having curved cam surfaces 51 and 52 for gripping the wire 19 in respective locking positions of the part 50. The part 50 has a narrow downwardly extending tail projection 53. The locking member 50 is pivotally mounted on the axle 17 of the load-transfer device. Movement of the tail portion 53 in one direction or the other causes a respective one of the cam surfaces 51, 52 to be brought into gripping engagement with the wire 19.

An actuating plate 54 has axially extending arcuate flanges 55 on each side thereof which engage in the grooves 19a in the respective wheel members, which also receive the flanges of the guide member 13. The plate 54 is formed with an elongate curved slot 56 which communicates at each of its ends with cylindrical recesses 57 and 58 for receiving, for example, a ring 59 which forms part of a load attachment means for connecting a load to the device. The ring 59 can therefore be detached from one recess 59 and moved along the slot to the other end thereof for snap engagement in the recess 57 located thereat. The plate 54 is further formed with a slot 60 extending from its curved upper periphery, on which the flanges 55 are located, to communicate with a central portion of the curved slot 56. The slit 60 is sufficiently wide to receive with clearance an end portion of the tail 53 of the locking member. The side surfaces of the slit 60 therefore provide abutment surfaces which can be brought into engagement with respective opposite sides of the tail 53 on rotation of the plate 54 to cause the locking member to pivot in one direction or the other.

In operation if it is required that the load-transfer device should slide freely when a load is applied thereto generally in the direction towards

the right in Figure 5 but to lock when the load is applied in the opposite direction, then the ring 59 is engaged in the recess 58 as shown in Figure 5. When the load is applied in the general direction along the wire 19 towards the right, the load-transfer device slides along the wire 19 with substantially no rotation of the plate member 54 so that there is no engagement with the tail 53 of the locking member. However, when the load is applied in the opposite direction then the plate member 54 rotates in an anti-clockwise direction causing engagement with, and then rotation of, the tail 53 of the locking member thereby bringing the cam surface 51 into gripping engagement with the wire 19 causing the load-transfer device to become locked to the wire in that position. When the opposite condition is required, the ring 59 is disengaged from recess 59, moved along to the opposite end of the slot 56 and then engaged in the recess 57. In this way a load may be applied in the direction generally towards the left with free sliding movement of the load-transfer device, but if the load direction is reversed the plate 54 will rotate clockwise to engage the tail 53 causing gripping engagement of the cam surface 52 with the wire 19.

During free sliding movement of this load-transfer device along the wire 19 lateral support members 20 can be readily traversed as described above in relation to the embodiment of Figure 3.

Figures 6 and 7 show a further embodiment in which a pair of wheels (only one of which is shown in figure 6) are mounted on an axle 60 which is located between the free ends of the arms of a yoke load attachment member 61. The wheels are located as in the previous embodiments in a spaced relationship with a wire guide member (not shown) located therebetween.

A locking member 63 is pivotally mounted on the axle 60 between the wheels of the device and has two peripheral cam surfaces 64, 65. The locking member 63 has at its lower end a forked tail part 66 which can be received in and moved through a slot 67 provided in the yoke member on rotation of the locking member. A latch member 68 is slidably mounted in an arcuate channel 69 provided through the thickness of the yoke member and is movable between a position in which it projects into the slot 67 (see Fig. 7) and a position in which it is withdrawn within the body of the yoke member. The latch member has a pair of grip portions 70, 71 projecting outwardly of the body of the yoke member for facilitating manual adjustment of the position of the latch member. Movement of the grip portions 70, 71 in the direction of arrows A moves the latch member into the slot 67 and movement in the direction of arrows B moves it out of the slot.

Therefore, the locking member 63 can be held in an inoperative position by engaging its tail portion 66 in the slot 67 and moving the grip portions 70, 71 in the direction of arrows A to engage the latch member 68 between the limits of the forked tail portion 66 thereby preventing rotation of the locking member in either direction.

The locking member is brought into a first operative position by releasing the latch member 68 therefrom, rotating the locking member in one direction and then moving the latch member back into the slot 67. The locking member is then free to pivot into order to bring one of its cam surfaces 64 into locking engagement with an elongate member, as described above in relation to the previous embodiments, when the load is applied in one general direction therealong, but is prevented from pivoting through the slot 67 in order to bring its other cam surface 65 into a locking position. In this way the device is freely movable along the elongate member when a load is applied in the other general direction along the elongate member. Conversely, in order to bring cam surface 65 to an operative position, the latch member 68 is retracted from the slot 67 and the locking member is swung through the slot to the other side thereof and the latch member is then engaged again in the slot 67 to block movement of the forked tail 66 of the locking member through the slot.

CLAIMS

1. A load-transfer device, which comprises at least one wheel having recesses formed in its periphery at evenly spaced locations therearound and separated by projecting parts of the wheel, and a cooperating guide member mounted on the wheel to form a unitary structure therewith, and adapted and arranged to allow rotation of the wheel about its axis with respect to the guide member while locating an elongate member with respect to the wheel such that when the device is moved along an elongate member slidably engaged with the guide member, transverse supports for such member are received, guided and passed in the recesses of the wheel which then rotates relative to the guide member while the elongate member is located with respect to the wheel by the guide member; and locking means mounted on the wheel and adapted to cooperate, when moved to a locking position, with a portion of the guide member so as to enable an elongate member slidably engaged, in use, with the guide member to be gripped firmly therebetween.

2. A device according to Claim 1 wherein said locking means comprises a locking member pivotally mounted about the axis of the wheel and is shaped such that in said locking position an edge portion thereof cooperates with said portion of the guide member as aforesaid.

3. A device according to Claim 2 wherein the locking member has an extension or cooperating actuating means for facilitating controlled movement of the locking member between said locking position and a free position.

4. A device according to Claim 2 or Claim 3 wherein the locking member has the form of a cam pivoted on the axis of the wheel and having a curved peripheral surface which can be brought into gripping engagement with an elongate member, in use slidably engaged with the guide

member, by pivotal movement of the locking member in one direction of rotation, the device otherwise being free to move along an elongate member engaged therewith.

5. A device according to any of Claims 2 to 4 wherein the locking member extends radially outwardly of the periphery of the wheel on the opposite side of its axis to the guide member when the locking member is in the locking position to provide a projecting portion which can be gripped by an operator or to which a load attachment can be secured.

6. A device according to any of Claims 2 to 5 wherein the locking member has two discrete curved peripheral cam surfaces and has means for altering the position of the pivotal axis of the locking member with respect to the axis of the wheel such that a respective one of the two cam surfaces is brought into an operative position, in accordance with a first position of said pivotal axis, for permitting locking of the device to an elongate member when the locking member is rotated in one direction, and for permitting such locking when the locking member is rotated in the other direction, in accordance with a second position of said pivotal axis.

7. A device according to Claim 6 wherein said means comprise a slot in the locking member in which an axle of the wheel engages and clamping means to locate such axle selectively at one or other end of said slot.

8. A device according to Claim 7 wherein said clamping means comprise a clamping member which is slidably mounted on the locking member between a retracted position allowing the axle to be freely moved along the slot and an extended position in which it projects into the slot to confine the axle in one or other end portion of the slot and actuating means to move clamping member between those positions.

9. A device according to Claim 8 wherein said actuating means comprise a screw member projecting from the clamping member and a nut member rotatably mounted on the locking member in cooperation with the screw member such that rotation of the nut member causes axial movement of the screw member to move the clamping member between said retracted position and said extended position and vice versa.

10. A device according to any of Claims 2 to 5 wherein the locking member has at least one curved peripheral cam surface to grip an elongate member in cooperation with the guide member and a part projecting generally radially of the axis of the wheel away from its curved cam surface(s), and is provided with actuating means mounted for pivotal movement about the axis of the wheel and having at least one abutment for engagement with said part of the locking member on sufficient pivotal movement of the actuating means in one, or a respective, direction to a position to bring the, or a respective, cam surface into gripping engagement with an elongate member extending in use through the device in sliding engagement with the guide member.

11. A device according to Claim 10 wherein the actuating means are adapted for the connection thereto of a load attachment means such that the actuating means are responsive to the direction of the load applied thereto so as to cause locking of the device by pivotal movement of the actuating means when the load is applied to one general direction along the elongate member and to allow generally free movement of the device along the elongate member when the load is applied in the other general direction along the elongate member with little or no pivotal movement of the actuating means.

12. A device according to Claim 11 wherein the locking member is provided with two cam surfaces on opposite sides of the axis of the wheel (in the longitudinal direction of an elongate member extending through the device in use), the actuating means being provided with two abutment surfaces for engaging opposite sides of said projecting part respectively when the actuating means are pivoted in one or other direction, and means are provided to allow adjustment of the position of the connection to the actuating means of said load attachment means such that in one such connection position, the device is free to move in a first direction along the elongate member when the load is applied generally in a first direction along the elongate member but is locked when the load is applied generally in the other direction along the elongate member, and vice versa for another such connection position.

13. A device according to any of Claims 10 to 12 wherein the actuating means comprise a plate member pivotally mounted on the wheel, the plate member having an elongate, generally arcuate slot therein extending around and outwardly of the periphery of the wheel, and in use in a position generally diametrically opposite the guide member, and two recesses adjacent opposite ends of the slot and communicating therewith to receive a load-attachment member engaged in the slot and which can thereby be moved along the slot to be engaged selectively in one or other recess at a respective end of the slot, the plate member being further formed with a slit extending from its periphery into the slot at a central part thereof, the slit being disposed to receive therein, with clearance, said projecting part of the locking member with opposite side walls of the slit provide two abutment surfaces for engagement with respective sides of the projecting part as aforesaid.

14. A device according to any of Claims 1 to 5 wherein a yoke load attachment element is provided to support an assembly of a pair of recessed wheels, the guide member and the locking means between its arms.

15. A device according to Claim 14 wherein the locking means comprise a locking member which has a tail portion movably through a recess in the body of the yoke member on pivotal movement of the locking member, latch means being provided to engage, when actuated, in the slot to block

movement of said tail portion therethrough.

16. A device according to Claim 15 wherein said tail portion has a slot therein in which said latch means can be engaged in order to fixedly locate the locking member with respect to the yoke member in said free position of the locking member.

17. A device according to any preceding claim wherein the wheel comprises two spaced wheels having corresponding and axially aligned recesses.

18. A device according to Claim 17 wherein the guide member is located between and at a peripheral portion of the wheels, and the confronting surfaces of the projecting parts of the wheels have arcuate grooves in which corresponding flanges on the guide member engage so as to retain the guide member between the wheels while allowing rotation of the wheels about their axes relative to the guide member.

19. A device according to Claim 18 wherein the wheels have generally dome-shaped outer surface to provide adequate material in the region of the grooves to reduce the likelihood of fracture thereat.

20. A device according to any of Claims 17 to 19 wherein the locking member is generally disposed between the wheels and is pivotally mounted on the axle thereof.

21. A load-transfer device substantially as hereinbefore described, with reference to, and as illustrated in, Figures 1 to 3, or Figure 4, or Figure 5, or Figures 6 and 7, of the accompanying drawings.

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